1-1-1961

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ROBINS - 1961

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Thesis submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree of Doctor of Philosophy

University of Massachusetts, Amherst

October, 1961

Table of Contents

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Introduction

Purpose

The purpose of this study was to determine whether the specificity of either form or color responses to inkblots is related to the capacity for behavioral control. Such a relationship is generally assumed in the evaluation of personality from inkblot responses. The nature of such a relationship is of further importance to the basic understanding of behavior.

Overview

Rorschach experts have informally hypothesized a relationship between the specificity of color responses, or "color ratio" and behavioral control on an empirical, nonexperimental basis. This hypothesis will hereafter be referred to as the color specificity - control hypothesis.

More recently Siipola (1952) has questioned why the specificity of all responses should not be used for this purpose, rather than just that of color. In other words, is there a more general specificity - control relationship? First, the informal statements of the color specificity - control hypothesis, the rationale behind such a hypothesis, and the evidence for it will be explored. Then the same will

be done for a specificity - control hypothesis.

The Color Specificity - Control Hypothesis

The Informal Color Specificity - Control Hypotheses. In the Rorschach Test, responses which are determined to any extent by the color of the blot, are scored form-color (FC) when the form component of the response is specific, color-form (CF) when the form is vague or less specific, and pure color (C) when form is absent, i.e., nonspecific.

The following statements made by Rorschach authorities are highly similar and postulate a relationship between the degree of behavioral control and the degree of specificity in inkblot color responses:

> Thus, the FC are expected to be, and actually are, associated with well-controlled emotional reactions while CF and C indicated a tendency to self centered and impulsive emotional reactions, the ratio of FC: (CF + C) serving as a measure of the degree of impulsiveness or emotional control respectively. (Piotrowski, 1957, p. 223.)
>
> ...C answers represent the tendency to impulsive emotional discharge.
>
> ....
>
> FC answers may be regarded as that instability which is necessary for emotional rapport with the environment. (Rorschach, 1942, p. 33.)
>
> When FC exceeds CF + C, but the latter are still represented by at least a few responses, the person is ordinarily capable of a controlled responsiveness to his social environment, responding appropriately with both feeling and action...if CF + C is absent or nearly so, the hypothesis is that there is excessive control....
>
> Where CF + C exceeds FC, there is weak control over emotionality and the person tends to act out his reactions in overt behavioral expression. (Klopfer et al., 1954, pp. 296-297.)

....

The undiluted color reaction, C, is the test's equivalent of the uninhibited feeling experience...the adult with pure C...is likely to be given to ungovernable impulses....

The CF, or color-form response, is characteristic for a less impulsive, but still highly labile reactivity.

....

(In the FC response) the individual is actuated by feelings, but even while responding to these, he masters them...it amounts to a willingness to be in emotional consonance with one's world.... (Beck, 1949, pp. 28, 29.)

We interpret (FC) responses as indications of the capacity for affective rapport, for emotional adaptation....Furthermore, the FC response indicates that the subject's actions are smoothly controlled, a course is taken, which allows for a reasonable discharge of tension....

....

The CF response stands for vivid, unfettered affectivity, for poorly controlled impulses, for spasmodic control of actions, and a general minimization of delay or constraint.

....

The pure color response represents either the extreme of impulsive and wild affectivity, or an abandonment of all control. (Rapaport, Gill & Schaefer, 1946, pp. 241-242.)

(Color-dominant color responses are found in three types of individuals:) (1) Subjects, mostly hysterics, in whose Rorschachs an abundance of color is accompanied clinically by an abundance of affect, <u>but not particularly by impulsive action</u>; (2) Subjects, including many who may be described as narcissistic or psychopathic character disorders, for whom the Rorschach color-emphasis seems clinically paralleled by impulsive action, <u>with only little or shallow affect accompanying the action</u>; and (3) Subjects, severely regressed chronic schizophrenics, in whom, clinically, neither affect nor action is outstanding, but who present a picture, rather of conspicuously disorganized thought, shallow, inappropriate, or "blunted" affect, and a degree of immobilization of action. These last are the patients who often give the purest color of all. (Shapiro, 1956, p. 52.)

Distinction Between Color Specificity and Color Total. Two components of color responses are color specificity and color total. It is important to differentiate these components because different processes appear to be at the basis of each. The Rorschach authorities have failed to clearly differentiate them. The scores in common use, such as number of FCs, CFs, or Cs, or Sum C represent a combination of color total and color specificity, and findings from research using these scores are, therefore, equivocal concerning the role of each component. The specificity of color responses in its purest form is the average specificity of all color responses. This score, which is independent of the total number of responses, will be used in this study. Color total, the other component of color responses, is unequivocally represented by the total number of color responses in a protocol, with no weight given to specificity. Unfortunately, these two components have rarely been isolated either in theory or in research.

In the statements by the Rorschach authorities specificity is implied when the ratio of specific to nonspecific color responses or preponderance of high or low specificity color responses is referred to. Some of the statements refer only to separate scoring categories, i.e., levels of specificity. Yet, the rationale for all these statements centers on a control or delay process which is used to account for specificity, but not for color total. The explanation of the

process contributing to color total has never been made clear and it has been given much less consideration in the literature than color specificity. This study is primarily concerned with color specificity.

Theoretical Explanations. Various attempts have been made to explain the relationship of color specificity to behavioral control.

Schachtel (1943) points out that perception of bright colors is a passive process, one that is upon us directly and is not due to volition. Emotional responses occur in the same way, and owing to the similarity, he feels that greater emphasis on color and less on form reflects emotional responsivity.

Shapiro (1956) criticizes this explanation on the basis of there being mental phenomena which have this same immediacy, e.g., "aggressive or sexual impulses, seizures of various sorts, inspirations, and finally the minor insights or bits of creative thinking which form a part of the daily life of everyone." This suggests that color responses should reflect all of these phenomena, and Shapiro thinks they do not.

In explaining the color-control relationship, Rickers-Ovsienkina (1943) also refers to the immediacy of color perception, but goes further to point out a difference in the amount of cognitive operations involved in color and form perception. She says that:

> We know from the psychology of perception that the perceiving of a separate form is the product of a gestalt process, consuming energy. Without the

> activation of these organizational forces, no form perception is possible. With respect to perception of color, however, the situation is different: apart from the fact that color differences within the visual field will demarcate different areas, and thus bring into play the factor of form with its organizational properties, the color perception as such is not correlated to complex processes of articulation and organization. Color experience, when it occurs, is thus a much more immediate and direct sense datum than the experience of the form (p. 48).[1]

She claims that color-perception is so simple and immediate that it is subject to influence by emotions which are present during the perception, and thereby, reflects emotionality.

Benton (1952) says that the qualitative features of color are of minor importance. The important factor is that color is one more quality or element of the inkblot, along with form that has to be incorporated into a percept. "Thus, it may be that the clinical significance of the FC response resides in the fact that the adaptable, flexible subject,

---

1. If color perception is simpler and more primary than form perception we should expect color to be preferred more by children than by adults, and more by disorganized patients than by normals. Various studies reveal that increasing age up to adulthood results in greater preference for form over color in various tasks (Thompson, 1941; Ford, 1946; Ames, 1952; Halpern, 1953; and Dworetzky, 1956). Hanfmann and Kasanin (1942) found schizophrenics to prefer color over form in sorting tasks. Weigl (1941) found the same for brain damaged patients.

We should also expect color sorting to be accomplished faster than form sorting. Hamlin et al. (1955) found this to be so. If color is easier to perceive than form, we would further expect that under time pressure pure color responses would become more prevalent on an inkblot test than ordinarily. Siipola and Taylor (1952) found this to be so.

when he encounters a visual stimulus situation, which includes color as well as form, is able to utilize both elements in his perception....(The FC) response is significant in its reflection of the fact that all elements in the visual stimulus situation were utilized by the subject and not because of any unique color properties of the blot" (p. 762).

It is apparent that Benton does not consider the combination of color and form in the CF response to be an integration, probably because the form in the CF response is vague and indefinite. The role of form is too minor for the response process to be termed an integration of form and color.

Although Benton does not specifically draw the relationship between color and behavioral control, it may be inferred that the person making the more integrated response (FC) is more likely to take the time to integrate the elements in any situation confronting him. Of course those who are less controlled are expected to make the less integrated response (CF or C).

Keehn (1953) takes a position similar to Benton's. He believes that responses combining form and color represent a reaction to the stimulus as a whole rather than to a part of it, form and color being separate parts which, combined, make the whole. The same rationale as presented for Benton also applies to Keehn's position.

Benton and Keehn differ from the other theorists in their belief that a part of the inkblot is easier to perceive than

an integrated whole. Color is thus easier to perceive because it is a part and not because of any intrinsic quality it may have. However, in order to explain why color as a part is perceived before any other part, it is necessary to come back to its "striking" quality, and this is the feature that the other theorists point to. The relative stimulus intensity of color, i.e., the ease with which it is perceived, remains the basic factor in its hypothesized role as an indicant of behavioral control.

Rapaport, Schafer, and Gill (1945) explain color responses in terms of delay. They claim that the greatest delay is necessary for an FC response, for the delay must "allow for the emergence in the course of the associative process of that content possibility, which could successfully integrate (form and color)." When delay is insufficient, the color and form cannot be integrated, and a C or CF is produced. The C response results when there is so little delay that form is not considered at all. Implicit is the notion that color is easier to perceive than form.

Shapiro (1956) has a similar position, but disagrees with the emphasis simply on control of emotional responsiveness. For one thing the clinical definitions of emotion lack unanimity and precision. Consider the terminology which has been used:

> ...emotional instability, irritability, sensitivity and suggestibility...self-centered and impulsive emotional reactions...ungovernable impulses

> ...uninhibited feeling experience...highly labile reactivity...vivid unfettered affectivity.

Shapiro's second point is that a preponderance of non-specific color responses can be found for people who are lacking control in two other areas, distinct from the emotional, namely, the cognitive and/or general behavioral areas. He cites three types of disturbances to illustrate the three areas (see p. 3). The emphasis on emotion by the other Rorschachers perhaps was not meant to differentiate the emotional from other areas of behavior. Rather, they probably intended, although less precisely, to point up the dynamic nature of behavior which cannot be delayed.

Shapiro's explanation (1956) emphasizes perceptual and ego passivity, which are respectively the perceptual and structural concomitants of inability to delay. He states:

> In the hierarchical organization of drive-delays and controls...an incapacity for delay of discharge can occur on many levels and in many forms and degrees, and one may speak of many forms and degrees of ego passivity. But, whatever its level, we should expect such passivity to be reflected, again in various forms and degrees, in a resorting to, or emphasis on, more passive or immediate perceptual processes, e.g., gross color perception (p. 58).

Shapiro has posited a broad personality characteristic or general factor which he refers to as the "incapacity for, or disinclination to, delay of discharge with regard to impulses, needs, affects, etc." (p. 58). He suggests that this basic tendency may be manifested in any or all of the three types of responses into which behavior is usually divided:

conative, affective, and cognitive. He points out that all of the explanations agree that color is generally perceived first and that it tends to produce simple, nonspecific associations. Delay of overt response is necessary for more specific form to be added to, or for a more specific response to replace an initial vague response.

Rationale for the Color Specificity - Control Hypothesis. The degree to which a person is controlled is by definition the degree to which he delays (see p. 23). Since the C response requires a minimum of delay and the CF and the FC responses require increasingly more delay, it is believed that the specificity of color responses should reflect an individual's capacity for behavioral control.

Empirical Findings for Color Specificity. In studies with children by Ames (1952), Ford (1946), Halpern (1953), and Klopfer (1941), it was consistently found that specific color responses became more frequent, the older the child. This increasing frequency can be interpreted as a function of the development of ability to delay, which generally increases through childhood. Although these findings are consistent with the color-control hypothesis, another explanation is that they could be a function of the child's limited ability to perceptually organize and/or his limited repertoire of responses, rather than a function of his limited behavioral control.

Siipola and Taylor (1952) obtained inkblot responses

under free and time pressure conditions. Time pressure was believed to prevent the occurrence of delay even if Ss were capable of it. A significantly greater number of C responses was found under the pressure condition although there was no difference in the FC and CF scores.

Holtzman (1950) investigated the relationship between intimate peer impulsivity ratings and Rorschach FC/CF ratios for 24 college men. He found an r of .42 but a replication with 22 subjects resulted in an r of only .07. Holtzman concluded that in his study a single isolated ratio was insufficient to differentiate the more impulsive from the less impulsive subjects.

Gardner (1951) investigated the Rorschach FC/CF + C ratio as it related to impulsivity-inhibition ratings made by peers and to ratings made by judges on the basis of Rosenzweig Picture-Frustration Test responses. For a ten subject sample, Rhos were found of .879 for peer ratings and .815 for P-F Test ratings. Both were significant at the .01 level.

Storment and Finney (1953) matched 23 assaultive neuropsychiatric patients with a comparable group of non-violent patients and tested them with the Rorschach. The CF/FC ratio and separate color scores did not discriminate the two groups.

Finney (1953) compared the Rorschach scores of 80 assaultive and 39 non-assaultive patients. Chi square was significant at the .05 level for CF scores (above and below the median). FC and CF/FC breakdowns above and below the median

were not significant.

Delinquent children are purported to be highly impulsive and lacking in control. Robbertse (1955) tested 100 normal and 100 delinquent South African children with the Rorschach. He found significant differences in the expected direction for the separate FC, CF, and C scores. The normal group had more FC, and less CF and C.

Schachtel (1951), however, found no significant difference for these same scores, nor for the FC/CF + C ratio between 500 American delinquents and their 500 matched controls. There was a trend though, for "a greater number of records with FC responses among the non-delinquents and...(more) records with pure C responses among the delinquents."

Depressed patients may be considered as overcontrolled while manic patients are thought to be undercontrolled. Wittenborn (1951) did a study comparing the Rorschach scores of 75 psychotics, grouped according to psychiatric diagnoses. A Chi Square test showed manic patients to have significantly higher CF scores than the combined group of all patients, while depressed patients had significantly lower CF scores than the combined group. No differences were found for FC and C scores.

Clark (1948) item analyzed Minnesota Multiphasic Personality Inventory items for a group of 100 college males according to how well the items discriminated Rorschach variables. He did not cite the probability of his findings, but

claimed that "apparently" there is a high degree of control for individuals falling beyond a certain point on the high end of the FC continuum. This control is manifested as over-caution in social standards, indecision, and sexual constriction to the extent that these are reflected in the items. A high number of CF responses was found to be "linked with impulsiveness and a lack of social consciousness."

A factor-analytic study by Singer, Wilensky, and McCraven (1956) on 100 male schizophrenics employed 23 measures each of which may be considered as reflecting behavioral control to some degree. The analysis yielded four factors which were labeled: (1) Motor Inhibition and Planfulness, (2) Ambitiousness or Need Achievement, (3) Emotional Surgency, and (4) Introspectiveness. Rorschach FC and CF scores had very low loadings on three of the factors. On Emotional Surgency, however, FC had a loading of .56 and CF a loading of .37. CF is expected to load positively on this factor as it is an indicant of lack of control. However, FC which is an indicant of control should load negatively or not at all on this factor. Contradictory to the theoretical position, FC has a considerably higher loading on emotional surgency than CF. Other loadings on this factor were aggressiveness on the ward .44, co-operativeness -.53, and diffuse motor anxiety .35.

The terms impulsivity and inhibition represent poles on the control continuum. Rapaport et al. (1946) compared Rorschach scores of highway patrolmen who had been rated on both

impulsivity and inhibition. The ratings were based on psychiatrist's interviews and the subjects' social and developmental histories. Subjects with high impulsivity had significantly more CF ($p < .05$) than those with low impulsivity. Subjects with high inhibition had significantly less CF ($p < .05$) than those with low inhibition. However, FC, while not resulting in a significant difference, was ordered contrary to the expected direction for both groups. The high impulsive group had more FC than the low impulsive group, and the high inhibited group had fewer FC than the low inhibited group. The color specificity - control hypothesis was supported by the findings for the CF score; the results for the FC score did not support this hypothesis.

Interpretation of Empirical Findings. Some of the findings of the perceptual, conceptual, and developmental studies cited suggest that the specific color response (FC) involves an inhibitory or delay process. When temporal pressure, organic deficiency, or immature development are present, a delay process is unlikely, and a greater number of less specific color responses, CF and C, have been found under these conditions.

In the nine Rorschach studies which employed measures of behavioral control and reported the significance of their findings, there was a total of twenty-six tests, eleven of which showed significance in the expected direction. There was not much difference between the tests involving ratios

(four significant out of seven) and those involving separate color scores (eight significant out of nineteen). On the basis of these findings it appears that the relationship of specificity in color scores to behavioral control is indefinite. Consideration of the factor analytic study (Singer et al., 1956) which had findings in the opposite direction, of the MMPI item analysis (Clark, 1948) which suggests that the expected relationship holds, and of the Siipola and Taylor study (1952) in which only one of the three color scores differentiated free and pressure groups, do not make the picture any clearer. Rapaport's study (1946) in which the CF scores followed the hypothesis, but the FC scores did not also did not clarify the color specificity - control relationship.

Other factors add to the equivocality of these findings. The studies using separate color scoring categories did not differentiate the roles of color specificity and color total in the relationships which were found. In none of the studies cited, except Siipola and Taylor's (1952) was the total number of responses (R) controlled. Cronbach (1949) pointed out the necessity for such a procedure. The greater the number of responses given, the greater may be the probability for obtaining more responses in some particular scoring category. For example, R may be correlated with CF or C, so that Ss tending to give more responses would have lower color specificity.

Further investigation is warranted of the color

specificity - control hypothesis in which the total number of inkblot responses is controlled and color specificity is clearly differentiated from color total.

The Specificity - Control Hypothesis

Background. In order to understand the specificity - control hypothesis, the criteria for scoring color responses will be examined more closely. Each response may be thought of in terms of its color and form components. The color-form responses (CF) and color responses (C) are those in which color is present and the form ranges from being vague or amorphous (e.g., sky, clouds, fire), to being absent. The form-color responses (FC), are those in which color is present and the form is specific (e.g., bluebird, human, bow tie). The specificity of the form component of the response, then, is the critical factor differentiating the various categories of color response.

The specificity of the response is not to be confused with form level. Klopfer et al. (1954, pp. 207 ff.) analyzes form level in terms of three components, one of which is specificity. Specificity refers to the definiteness and delineation of the response itself, and is independent of the blot. Another component is called organization, and involves the integration of separate blot qualities and/or areas into one response. A third component is termed matching, and is a measure of how well the response fits the configuration of the blot.

Only specificity enters into color scoring. In other words specificity determines whether a response is scored FC, CF, or C, and thus it was chosen as the focus of attention. The actual role of color is now somewhat clearer. It appears that color is perceived first and tends to produce primitive or nonspecific associations. Increasing delay apparently is necessary for increasing form specificity being added to or replacing color. But is color the only blot quality which can be responsible for, or justify undelayed, nonspecific associations? From another aspect, "Does specificity reflect behavioral control only when color is also present in the percept?"

Siipola and Taylor (1952) examined specificity closely. Their conclusions derive from an inkblot study with college girls utilizing a constant response (one response per card) inkblot administration under four conditions:

1. Achromatic blots under free conditions.
2. Achromatic blots under pressure conditions.
3. Chromatic blots under free conditions.
4. Chromatic blots under pressure conditions.

The pressure condition required that S respond with the first response that occurred to her, while free conditions imposed no limitation. The pressure condition tended to prevent delay from occurring.

It was found that for either chromatic or achromatic blots the pressure condition resulted in significantly more indefinite or nonspecific responses than the free condition.

From another level of analysis it was found that the pressure condition resulted in significantly more nonspecific non-color responses as well as significantly more nonspecific color responses. They conclude:

> If prompt, formless concepts occur whenever a primitive sensory type of organization is set off, then there is no a priori reason why their occurrence with chromatic blots should signify anything different from their occurrence with achromatic blots.
>
> ....
>
> The fact that we have regarded (nonspecific) ...responses to achromatic blots as essentially the same kind of primitive immediate reactions as color responses raises the question of why Rorschach selected only color response as the indicator of impulsivity....(In this study) it is notable that colored blots produce more of these formless responses under free conditions than did achromatic blots under pressure. The presence of color evidently does have special effectiveness in inducing the primitive formless type of response. Rorschach's connecting of color with impulsivity was probably based merely upon this fact. Granting the truly remarkable potency of color to set off the primitive type of conceptualization, it is still our contention that the underlying process is one which can be induced by other stimulus dimensions and that it is unnecessary to attribute to color a unique, somewhat mysterious, connection with impulsivity (pp. 41,42. Italics added).

Rationale for the Specificity - Control Hypothesis. In the previous section it was noted that the rationale for a color - control hypothesis is as follows. Specificity appears to be a function of delay and is related to behavioral control, for by definition, behavioral control is the degree to which a person delays (see p. 23). It seems that color tends to produce responses of low specificity more easily than the other blot qualities. However, it is the specificity which reflects

control and there is no reason why specificity should reflect control only in the presence of color.

The rationale for a specificity - control relationship is similar to that for a color specificity - control relationship. In either case the less controlled person is expected to respond more frequently to that component of the stimulus which is easiest to perceive while the more controlled person responds more frequently to aspects of the stimulus which require greater cognitive organization. In either case, it is believed that further cognitive elaboration, representing greater behavioral control, is reflected in increasing specificity of the form component of the response. The difference is that in the color response, color provides a stimulus which (1) may be sufficiently impelling to prevent further cognitive elaboration and/or (2) may justify a vague response. For non-color responses some other blot quality can be responsible for primitive associations. In both instances, however, the specificity of the form component of the response is the indicant of control.

Empirical Findings. Outside of the Siipola and Taylor study (1952) there has been very little experimental use of the specificity concept. Wittenborn (1950a, 1950b) isolated a factor in Rorschach protocols which was essentially a general specificity measure. He also found, as expected, that patients who had undergone frontal lobe brain surgery had lower specificity measures on the Rorschach than did their controls

(1951). He notes further (1951) that inspection of Harrower-Erickson's Rorschach score frequency distributions (1945) reveals a tendency for more specific scores to increase on a second administration of the test. This is consistent with the specificity - control hypothesis in that, "It is plausible to suppose that perception is better controlled and less spontaneous in a familiar situation than in a grossly unfamiliar situation such as the first presentation of the Rorschach cards" (p. 334).

Holtzman (1960) has included a separate specificity score in his new inkblot test, but no research has yet been reported with it.

None of these studies have directly tested the specificity - control hypothesis by relating Ss' behavioral control measures to their specificity measures. One of the purposes of the current study was to test this hypothesis.

Behavioral Control

Delay and Control in Personality Theory. In psychoanalytic theory (Freud, 1946), the term, primary process is used to refer to the discharge of impulses in the most immediate way. This is typical of the infant. As development progresses a degree of control, or delay of impulse discharge, is attained. This generally involves the interpolation of thinking between the impulse and the overt response, and is termed the secondary process. Rapaport (1946), summarizes this notion in the following statement:

> ...the development of the ego and its thought processes, represents a progressive mastery over impulses. A delay between impulse and its discharge, must come about so that during this delay, the reality situation may be "tested," and the least dangerous way of reaching the goal, be discovered. Thus, thought serves the impulse but is rendered possible only by a delay of its discharge (p. 214).

The FC response, or any specific response, apparently requires that the initial impulse and associations to the inkblot, be delayed until a more specific percept can be thought out (i.e., secondary process is required). When a subject responds with diffuse, vague objects (and/or relies primarily on color to justify them) the primary process is thought to be operating.

Behavioral control, i.e., delay of response, is an important and useful characteristic, but when the tendency becomes too strong it frequently becomes a liability. For any particular situation where a response is called for there is an optimum amount of thinking, and beyond this further thought is detrimental to an optimal response, or at least a waste of time and energy.

Appropriate behavioral control is, of course, a characteristic of the adjusted person. Poor adjustment and pathology are concomitant with both inability to delay impulses (undercontrol), and too much delay (overcontrol).

Fenichel (1945) describes overcontrol in neurosis and compulsion:

> ...there are pathological states in which

> the general inhibition dominates the clinical picture....The chronic form appears as a lifelong attempt to keep down some 'dangerous' impulse at the expense of the development of the total personality (p. 186).
>
> The compulsive type regresses from action to the preparation for action through words; his thinking is a kind of internal preparation for actions that are never performed (p. 50).

He explains that pathologically undercontrolled people are generally intolerant of tensions. The infant tries to discharge tensions immediately and reacts to excitement with uncoordinated movements. Adult development is based on "...(a) the physiological capacity for mastering motility, that is of changing uncoordinated discharge movements into purposeful actions, and (b) the ability to postpone immediate reaction" (p. 367). Highly impulsive people have mastered motility but find it difficult to postpone immediate activity. They still have the infantile need to immediately reduce tensions.

Measures of Behavioral Control. The measurement of behavioral control has been dealt with in different ways. Some investigators have used a simple "impulsivity-inhibition" dimension as measured by peer ratings (Holtzman, 1950; Gardner, 1951). Some have been more interested in specific aspects of control such as assaultiveness (Storment & Finney, 1953; Finney, 1953), delinquency (Robbertse, 1951; Schachtel, 1951), motor inhibition (Meltzoff et al., 1953, 1954; Singer et al., 1952; Levine et al., 1957), cognitive inhibition (Levine &

Meltzoff, 1956), and affective inhibition (Meltzoff & Litwin, 1956).

Twain (1957) factor analyzed tests involving "impulsivity" and found it to have several components. He used 16 tests such as Speed, Change, Optimism, Persistence, Attitude Toward Chinese, etc., as representing different manifestations of impulsivity and derived the following factors: 1. Flexible Motor Control. 2. Positive Progressiveness. 3. Tenacious Self-control. 4. Aggressive Instability.

It is evident that there are many criteria which can be used for measuring behavioral control and no one can be considered as the ultimate one. In this study, behavioral control will be considered as a construct, consistent with the thinking presented in the article on construct validity by Cronbach and Meehl (1955). They describe a construct as "some postulated attribute of people, assumed to be reflected in test performance." A construct may begin with a specific relationship and become more general as a network of related relationships are determined.

Definition. The Rorschach authorities have not agreed upon a precise definition of behavioral control. For the purpose of this study, the following formal definition will be used:

> Behavioral control is a tendency to delay a prepotent response, thus permitting the intervention of thought which may in turn modify or change the response.

Behavioral control has no connotations of good or poor adjustment. Such connotations belong to modifications of the basic term, e.g., behavioral overcontrol and undercontrol would be associated with poor adjustment and appropriate behavioral control would be associated with good adjustment. The terms "more controlled" and "less controlled" will be used only to indicate relative positions along the control continuum.

It may be assumed that the less controlled person tends to respond overtly to the first thing he perceives, while the more controlled person tends to delay responding until he has attempted some kind of cognitive resolution of the situation confronting him. On an inkblot test then, it would be expected that people with less behavioral control would produce more nonspecific color or form responses. The more controlled person would produce a greater number of specific color or form responses.

Tasks Found Useful for Evaluating Behavioral Control. Three experimental tasks are pertinent on the basis of (1) their having been found to be related to other Rorschach scores also purported to be indicants of behavioral control, and (2) an analysis of these tasks which suggests that behavioral control is being measured by them.

Rosenthal (1954) in investigating the relationship between behavioral control and the Rorschach experience-balance (M/C) used direct and highly specific measures. The measures

consisted of total number of moves and latency of the first move on a stick rearrangement problem. From a pool of 86 college students, two groups of the ten Ss at each M/C extreme were compared on their movement and latency match stick scores. Significant differences were found for both movement and latency scores, for each of nine stick problems. The high M-low C group as expected, had longer latencies and fewer movements.

An analysis of the task suggests that the solution requires both cognitive exploration and actual trial and error movements. The nature of the solution is such that trial and error movements alone will rarely succeed. Generally, it may be expected that the more controlled person will delay his movements, attempting to work out the problem mentally, while the lesser controlled person probably will begin trial and error movements after only a brief delay for cognitive activity. It may also be expected that the more controlled person will show greater delay between his trial and error movements in order to engage in cognitive activity thus attempting fewer movements for solution. The less controlled person should behave in the reverse fashion. The latency measure appears to represent tendency to delay and the movements score, a lack of it.

Another measure reflecting behavioral control is the Motor Inhibition Task. It is adapted from the Downey Will Temperament Scale (1924) and consists of writing the phrase

"New Jersey Chamber of Commerce" as slowly as possible without lifting the pencil from the paper. Singer and Spohn (1954) found a significant correlation of .29 between MIT scores and the number of inkblot M scores. Singer and Herman (1954) found a significant correlation of .539 between MIT and M scores. Meltzoff et al. (1953) found Rhos of .41 and .60 between MIT and M scores for two respective groups.

Also successful in reflecting control is the Cognitive Inhibition Task (CIT). This task requires Ss to inhibit a recently learned response word and respond with another word when they hear the original stimulus. Levine and Meltzoff (1956) tested 93 neuropsychiatric patients and found that Ss with high inkblot M scores were better able to inhibit cognitive associations (i.e., had significantly lower CIT scores) than were Ss with low M scores. Cognitive inhibition, a measure of behavioral control, was thus found to be positively related to the production of M responses, supporting the hypothesis that M is related to behavioral control.

Intelligence and Human Movement Scores as Related to the Specificity Scores

More intelligent individuals may tend to delay longer in many challenging situations since they have the capacity to engage profitably in greater cognitive activity. Intelligence and the production of specific responses may therefore be related to some extent. The relationship will of course be far less than perfect as there are many factors besides

intelligence which influence behavioral control.

There is also evidence that the human movement inkblot response is related to behavioral control (Singer et al., 1952; Meltzoff et al., 1953). It is therefore important to assess the contribution of these factors to any possible relationships found.

Summary of Findings for Specificity in Color and Non-Color Responses

On a nonexperimental basis, Rorschach experts hypothesized a relationship between the specificity of inkblot color scores and behavioral control. This relationship has been explained generally as a function of the tendency of less controlled people to respond overtly to the first thing they perceive with nonspecific responses, while more controlled people tend to delay their initial reactions and respond more often with "higher level" specific form aspects of the blots (Piotrowski, 1957; Rorschach, 1942; Shapiro, 1956).

The findings of perceptual studies (Hamlin et al., 1955; Siipola & Taylor, 1952), conceptual studies (Weigl, 1941; Hanfman & Kasanin, 1942), and developmental studies (Ames, 1952; Ford, 1956; Halpern, 1953; Klopfer, 1941), support the notion that color is easier to perceive than form, but the overall results of the direct tests of the color-control relationship appear to be equivocal (Holtzman, 1950; Gardner, 1951; Storment & Finney, 1953; Robbertse, 1951; Schachtel, 1951; Wittenborn, 1951; Clark, 1948; Singer, Wilensky &

McCraven, 1956; Rapaport, 1946).

A major factor in inkblot test color responses was seen to be the specificity of the form component of the response. The Siipola and Taylor study (1952) raised the question of whether color must be present in order for form specificity to adequately reflect behavioral control. Considered from another aspect the question becomes: "Is specificity related to behavioral control only when it is measured in color responses, or is it also related to behavioral control where color is absent as in the form response?"

Statement of the Problem

This investigation attempts to determine the relationship between the specificity of inkblot color responses and a measure of behavioral control. It also investigates the extent to which specificity of form responses to achromatic blots is related to this measure of behavioral control.

The meaning of specificity in color and form responses was further assessed by determining the relationship of these inkblot scores to separate measures of control. Intelligence and the tendency to see human movement on the inkblots are controlled for by partialling out any correlation these two factors have with the major variables.

Hypotheses

Two experimental hypotheses were formulated for testing: I. A color specificity index giving increased weight to greater specificity of color responses on the inkblot test will be

positively related to an index of behavioral control based upon ability to (1) delay responding with the prepotent word in a word association task, (2) delay overt responding in a problem solving task, and (3) slow motor tempo in a writing task.

II. A specificity index giving increased weight to greater specificity of form responses to achromatic cards on the ink-blot test will be positively related to an index of behavioral control based upon ability to (1) delay responding with the prepotent word in a word association task, (2) delay overt responding in a problem solving task, and (3) slow motor tempo in a writing task.

Experimental Method

Procedural Summary

The overall procedure was as follows: Ss were individually tested in two sessions. In the first session forty male Ss were initially screened for faulty color vision with the Ishihara Color Vision Test. The inkblot test followed, and then the cognitive inhibition task. In the second session which was always on the following day, the word association task, motor inhibition task, stick problems and intelligence measure, were administered in that order to these Ss.

Subjects

Forty male patients from the Manhattan General Medical and Surgical Veterans Hospital were used. They were randomly selected patients who met the following criteria:

1. Good color vision.
2. Absence of psychosomatic illness.
3. Absence of psychopathology.
4. Absence of alcoholism.
5. Absence of morbid pathology.
6. Fifty years of age or under.

To obtain forty Ss, 61 patients who met the above criteria, had to be approached. Of these, forty-nine agreed to serve in the experiment. Nine of these were discarded for the following reasons: two for having previous experience with the test, two for faulty color vision, two for failing to give two responses per card, and three for failing to give any color responses. The age range of those used was from 22

to 49 years. The mean age was 36.6 and the standard deviation was 7.50. None of these Ss displayed any observable signs of behavioral pathology.

Apparatus

The cognitive inhibition task and the word association task consisted respectively of the following lists of paired and single words, all taken from the 1000 words with the greatest frequency in the Lorge magazine count (Thorndike & Lorge, 1944).

picture	- paint	river
street	- city	mile
plant	- garden	month
wish	- star	office
news	- listen	book
return	- letter	nation
window	- building	report
cook	- dinner	nature
money	- green	learn
minute	- watch	island

The motor inhibition task utilized a pencil, a sheet of paper with a half inch set of lines ruled on it, and a guide card with the phrase "New Jersey Chamber of Commerce" typed on it.

The stick problems used were modifications of those developed by Katona (1940) and consisted of 1 1/2" x 3/16" x 3/16" wooden pegs, diagrams of the designs, and a nine by twelve inch wooden surface painted flat black. A stop watch was used for measuring the latency of the first movement.

The Ishihara Color Vision Test consisting of plates in which a greenish-yellow number is embedded in an orange-yellow

field was used to test Ss color vision.

The inkblot test consisted of all ten cards from the Rorschach Test, and Cards VIII and IX from the Behn-Rorschach Test, making a total of twelve cards, seven chromatic and five achromatic.

A measure of intelligence was obtained through the administration of the Wide Range Vocabulary Tests.

Procedure

Ss were introduced to the battery of tests in the following way: "We are conducting some research to try to improve some of the tests we are now using. We would therefore appreciate your cooperation. There are five different kinds of tests and they will take about two or three hours altogether."

Ss were then tested individually according to the following procedure.

1. Ishihara Color-Vision Test. Ss were told: "This is a simple test, to check your vision. Just tell me the number that you see on each card which I will show you."
2. Inkblot Test. Ss were then tested with an inkblot test consisting of the ten Rorschach inkblots in their normal sequence followed by the Behn-Rorschach blots, numbers VIII and IX. The administration conformed to the standard procedure described in the Rorschach system of Klopfer et al. (1954) with the exception that Ss were required to give two responses per card. The procedure was as follows:

a. Free Association. The instructions were:

> The test you are about to take is an unusual one, and I think you will find it interesting. I am going to show you some inkblots which have been made by dropping some ink on paper and folding it over. Have you ever taken an inkblot test? All right, you just tell me what they look like or resemble. There are no correct or incorrect answers. Everybody sees different things. For every card I show you give me two responses, tell me two separate things that you see.

b. Inquiry. After all the cards were responded to, the examiner said: "In this second part I'd like you to show me exactly where on the blot you saw each of these things and what there was about the blot that made you think of them." The examiner marked the locations on standard location sheets and recorded as close to verbatim as possible Ss' explanatory comments.

3. Motor Inhibition Task. Ss were presented with a sheet of paper on which there were two ruled lines a half inch apart, a pencil, and a guide card on which was typed the phrase to be written. He was instructed: "Write these words, 'New Jersey Chamber of Commerce' between the lines on this sheet of paper as slowly as you possibly can, without stopping and without taking the pencil off the paper." At 45 second intervals he was reminded, "Write as slowly as you possibly can." The performance was timed to the nearest second with a

stopwatch.

The task appears to be loaded with a motivational component of control. As the slow writing continues feelings of fatigue and discomfort increase greatly, resulting in the impulse to speed up and have the task done with. This is primarily what must be inhibited. An additional and somewhat different inhibitory process appears to be necessary to slow down the normal writing tempo without stopping the motion entirely.

4. Cognitive Inhibition Task. This task consisted of Ss first memorizing ten word pairs to a criterion of two perfect repetitions. Then the first word of each pair was presented with the instructions to respond with the first word that comes to mind other than the just-learned association. From the median reaction time for the ten words in this second part of the task was subtracted the median reaction time to a similar list of words for which new associations have not been learned. This left that component of the score which resulted from the time consumed in having to inhibit the just-learned association.

Presumably, Ss who had more control of their associative processes were able to inhibit the just-learned association in favor of a new one. Therefore, they responded more quickly with a new association and their CIT scores were lower. Ss with less control took longer to inhibit the just-learned association thereby increasing the latency of a new

association and ultimately making the CIT score higher.

Ss were instructed: "I will read ten pairs of words. Repeat each pair of words as you hear them and try to remember the second word that goes with the first one. For example, if I say dog-cat, food-table, book-game, then later when I say the word 'dog' you will be able to say 'cat.' When I say the word 'food' you will be able to say 'table' and when I say 'book' you will say 'game.'" On the first trial E said: "This is the first time through. Just repeat the words and try to remember the pairs." On the second trial E said: "From now on, I will say the first word and you say the second word right after. If you cannot remember it, in six seconds I'll say it and you repeat the whole thing. After a few times through you will remember them all." Trials continued until S reached the criterion of two perfect repetitions of the ten pairs. Then S was instructed: "I am going to say the first word of each of these pairs again, but this time instead of saying the word you just learned, say any other word that it brings to mind. Any word except the one you just learned is all right." Reaction times were recorded to the nearest half second. At this point the first session was concluded and an appointment made for S to return on the following day.

At the beginning of the second session Ss were told that this session would take about one hour. They were first given the alternate list of words and asked to free associate

to them according to the following instructions: "There is nothing to memorize this time. This is a new set of words. As you hear each word, say any word that it brings to mind. Any word at all is all right." Again, reaction times were recorded to the nearest half second. The median reaction time for the second procedure, subtracted from the median reaction time for the first procedure resulted in the Cognitive Inhibition Time score (CIT).

5. Stick Task. The sample problem[2] was presented with the instructions:

> We are interested in finding out how certain kinds of problems are solved. The ones we are using, require changing the position of sticks so as to make one design out of another.
>
> Here is a sample. When I tell you to begin, move only two sticks so that there will be six squares instead of seven. The squares must be the same size with no sticks left over. It is not a trick solution. You will have four minutes. Are there any questions? Are you ready? Begin.

A stop watch was held discreetly, but not hidden from S. The latency of the first move (i.e., the time from the word "Begin," till the first stick was touched) was noted and recorded at the end of each problem. The number of moves was kept track of mentally by E and recorded at the end of each problem.

At the end of four minutes, or whenever a solution was reached, E openly made a notation, but not visible to S.

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2. See Appendix A.

This allowed E to record the latency and total time. The solution was also recorded. The solution was of no consequence to the experiment proper, but this was not revealed to S. For Ss who did not achieve a solution at the end of four minutes, the correct solution was demonstrated.

Three more stick problems were presented with the same procedure for scoring. Instructions were read before each presentation as follows:

> In this and the remaining problems you will always move three sticks. When I say "Begin," move three sticks to make ___ squares. Just as before the squares must be the same size with no sticks left over. You will have four minutes.

The problem was always to move three sticks and to make one less square than the number presented. A diagram of the design accompanied each problem so that Ss were able to reconstruct if their unsuccessful moves upset the original formation.

It is conceivable that a subject may have been so overwhelmed by the problem that he found it difficult to think and became "blocked." It is not likely that a non-psychiatric subject would "block" to such an extent that he would be unable to think about the problem and would also refrain from trial and error movements. It is possible that such Ss may find the problem so difficult that they refuse to continue, but such occurrences are readily observable because these Ss announce their intention or are openly inattentive to the problem. It seems reasonable to assume, therefore,

that the Ss in this study were engaged in some kind of cognitive activity related to the problem if they were not making movements and had not withdrawn from the situation.

6. Intelligence Measure. Vocabulary is generally considered to be the best single estimate of intelligence. The Wide Range Vocabulary Test, Form B by Atwell and Wells (1937) is a 100 item, paper and pencil test commonly used for a quick estimate of intelligence. It is a multiple choice modification of the vocabulary section of the 1916 Stanford Binet. It was standardized so that increasing grades up through four years of college have mean score increments of approximately five units. Atwell (1937) reports a correlation of .81 with the Army Alpha. Sturm (1960) reports a split half reliability of .94.

Scores

Inspection of the score distributions revealed skewness in some categories so that it was decided to convert all of the scores to T scores (Edwards, 1954). This resulted in scaled and normalized distributions.

Behavioral Control Index (BCI). Of the following scores, the first three constituted the behavioral control index. The fourth was dropped from the index for reasons explained below.

Cognitive Inhibition Time (CIT). This score resulted from the median word association time for the unpaired list subtracted from the median word association time for the paired list.

Motor Inhibition Time (MIT). This score consisted of the performance times for this task.

Stick Task Latencies (SL). This score consisted of the median latencies for the first stick movement.

Stick Task Movements (SM). The number of movements made were divided by the number of minutes, or fraction thereof, required to reach a solution, so that the scores represented movements per unit time. If no solution was reached, the maximum time limit, four minutes, was the divisor. The final score was the median for movements per unit time, for the four stick problems.

The Behavioral Control Index was originally to have been obtained by adding the Stick Latency T score to the Motor Inhibition Time T score. This would represent the tendency towards control. Then, the sum of the Stick Movements T score and the Cognitive Inhibition Time T score, representing the tendency to be uncontrolled, were to be subtracted leaving an index in which each of the contributing scores were weighted equally. However, there was found to be a very high negative correlation (-.85) between the two stick scores, movements and latency. This suggested strongly that both scores were measuring the same factor, from opposite directions. A reappraisal of the two measures arrived at the conclusion that the process contributing to the latency measure is essentially the same as that generally occurring between movements. In effect then, to have used both scores in the

Behavioral Control Index would have given double weight to the Stick Task. It was thereupon decided to use only one of these scores. The movements score was chosen, since the larger number of responses contributing to it, probably made it a more reliable measure of the control process involved in the Stick Task. The BCI therefore, consisted of the sum of SM plus CIT scores subtracted from MIT scores. For convenience of computation this score was again converted to a T score.

Inkblot Scores: Color Specificity Index (CSI) and Specificity Index (SI). The protocols were scored according to the specificity guide[3] used in this study by two judges thoroughly versed in the Klopfer System (1954). There was 95.5% agreement between the judges on the specificity scores for color and form responses. Instances of disagreement were resolved by a similarly trained third judge.

The scoring followed Klopfer's system with the following exceptions:

a. No additional responses (beyond the 24 requested) were scored.

b. A complex response was considered as specific as its most specific component.

c. Tendencies were not scored.

d. No distinction was made between "symbolic," "arbitrary," "forced" or "inaccurate" use of color.

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3. See Appendix B.

The scoring classifications for color, as in Klopfer's system, were based on the specificity of the response content. To obtain a more refined measure, four divisions rather than the usual three were used:

C ..... Pure color with no form.

CF .... Color with amorphous form.

C/F ... Color with very simple or moderately specific form.

FC .... Color with specific form.

The specificity index utilized only those form responses given to the achromatic cards to insure that any influence of color was ruled out. These responses were scored for specificity on the same basis as were the color responses:

N ..... No form, i.e., abstract or impressionistic response.

NS .... Amorphous form.

N/S ... Very simple or moderately specific form.

S ..... Specific form.

This made the color scores equivalent to the form scores as measures of specificity. The color and specificity scores were based solely on the content of the response.

The weights given the scores were as follows:

C or N ... 2

CF or NS ... 3

C/F or N/S ... 4

FC or S ... 5

The higher the score, the more control was represented in the production of color or form responses.

The specificity and color specificity indices were derived following procedures used by Williams (1947) and Benton (1952). The weighted scores were summed and divided by the number of contributing scores. For example:

2CF + 2C/F + zero FC ⟶ 14/4 = 3.50

zero CF + 1C/F + 5FC ⟶ 29/6 = 4.83

or

2NS + 2N/S + zero S ⟶ 14/4 = 3.50

zero NS + 1N/S + 5S ⟶ 29/6 = 4.83

This procedure provided a measure of mean specificity and set the range from two to five units with scores determined to three places.

Of the following scores, M and IQ were used for the partial correlation procedure. The rest were used for additional analyses.

Intelligence (IQ). Intelligence was estimated from scores on the Atwell and Wells Wide Range Vocabulary Test.

Human Movement (M). This score was the total number of human movement responses.

Total Number of Color Responses (#C).

Total Specificity. This score constituted the mean specificity for the entire twenty four inkblot responses.

Inkblot Latency. This score was obtained by taking the median of S's first response latencies for all twelve blots.

Results

The means, standard deviations and ranges of all scores are presented in Table 1.

All of the correlations reported were computed by the Pearson product moment formula. In accordance with directional hypotheses one-tailed tests were used. The correlation required for significance at the .05 confidence level was .26.

Correlations were computed for the major variables: the Behavioral Control Index (BCI), the Color Specificity Index (CSI), and the Specificity Index (SI). They are reported in Table 2. These results indicate that no relationship was found between the specificity of either form or color responses and the ability to control behavior as measured in this study.

Correlations were computed for the Human Movement score (M) and the intelligence score (IQ) with the major variables (Table 3). The correlations with IQ were as follows: BCI, .12; CSI, .02; and SI, .19. The correlations with M were as follows: BCI, .08; CSI, .43; and SI, .18. Only the correlation between M and CSI was significant at the .05 level indicating that greater specificity in color responses was related to higher production of M responses. These correlations were obtained so that the effects of these two important variables could be partialled from both the BCI to SI

Table 1

Mean, Standard Deviation, and Range of the Scores Obtained in This Study

Score	Mean	Standard Deviation	Range
Motor Inhibition Time in seconds (MIT)	31.25	32.74	1 to 121
Cognitive Inhibition Time in seconds (CIT)	0.78	0.98	-1.00 to 3.75
Stick Movements per minute (SM)	2.53	1.52	0.19 to 8.00
Intelligence Measure (IQ)	68.63	15.94	40 to 93
Behavioral Control Index (BCI)	-50	-10	-28 to -72
Color Specificity Index (CSI)	3.97	0.53	3.00 to 5.00
Specificity Index (SI)	4.46	0.22	3.71 to 5.00
Total Specificity (Tot Spec)	4.37	0.69	4.00 to 4.88
Specific Form Responses (S)	3.17	1.92	0 to 9
Moderately Specific Form Responses (N/S)	1.55	1.25	0 to 5
Amorphous Form Responses (NS)	0.67	0.80	0 to 3
Abstract Responses (N)	--	--	--
Color with Specific Form (FC)	1.32	1.42	0 to 6
Color with Moderately Specific Form (C/F)	1.32	1.18	0 to 4
Color with Amorphous Form (CF)	1.68	1.29	0 to 4
Pure Color (C)	.08	--	0 to 2
Human Movement (M)	1.98	1.29	0 to 6
Total Color (#C)	4.33	2.61	1 to 8
Inkblot Latency in seconds (IL)	27.73	12.46	6.5 to 46.5

Table 2

Results of Pearson Product Moment Correlations for the Behavioral Control Index with the Color Index and the Specificity Index

	BCI
CSI	.10
SI	-.12

Table 3

Results of Pearson Product Moment Correlations for Human Movement Responses and the Intelligence Score with the Major Variables

	IQ	M
BCI	.12	.08
CSI	.02	.43*
SI	.19	.18

* Significant at the .05 confidence level.

and the BCI to CSI correlations by means of a partial correlation procedure (Table 4). The BCI to CSI correlation was .08 with M partialled out, and was .10 with IQ partialled out. The BCI to SI correlation was -.12 with M partialled out, and was -.15 with IQ partialled out. None of these partial correlations were significant indicating that the negative findings for the color specificity - control and specificity - control hypotheses were not a function of the interrelating effects of either M or IQ.

Correlations were computed among the separate behavioral task scores, the extreme score categories contributing to the Color Specificity Index, and the extreme score categories contributing to the Specificity Index (Table 5). It was found that FC correlated -.11 with CIT, .05 with MIT, and .19 with SM. CF + C correlated .06 with CIT, .10 with MIT, and .26 with SM. Only one of the six correlations involving color scores, that between CF + C and SM was significant. This indicated that production of CF + C responses was positively related to the number of stick movements in the problem solving task. S scores correlated .30 with CIT, .02 with MIT, and .16 with SM. The NS + N scores correlated .18 with CIT, -.18 with MIT, and -.26 with SM. None of these six correlations involving form specificity scores were significant.

Since a significant relationship was not found between either color or form specificity and the Behavioral Control Index, it was decided to combine the specificity of all the

Table 4

Results of Partial Correlations Among the Major Variables when Human Movement or Intelligence Scores are Held Constant

Variable 1	Variable 2	Variable Held Constant	Partial r
BCI	CSI	M	.07
BCI	CSI	IQ	.10
BCI	SI	M	-.14
BCI	SI	IQ	-.15

Table 5

Results of Pearson Product Moment Correlations Among Separate Scores Composing the BCI, SI, and CSI Indices

	CIT	MIT	SM
FC	-.11	.05	.19
CF + C[a]	.06	.10	.26*
S	.30[b]	.02	.16
NS + N	-.18	-.18	-.26[b]

* Significant at the .05 confidence level with a one-tailed test.

a. There were so few C scores that this category was combined with CF.

b. These correlations were not significant because they were not in the hypothesized direction.

responses in the record to obtain a Total Specificity Index (Tot Spec). This allowed an additional test of the specificity - control hypothesis with a more comprehensive measure of specificity. There were correlations of -.07 between Tot Spec and BCI, .12 between Tot Spec and CIT, -.03 between Tot Spec and MIT, and -.10 between Tot Spec and SM (Table 6). None of these correlations were significant.

Correlations were computed between Stick Movements and different kinds of color scores, and are reported in Table 7. The correlation between CSI and SM was .01. The correlations between CF + C, FC + C/F, and #C with SM were respectively .26, .36, and .37. These three were significant and indicate that Ss with more stick movements gave more CF + C responses, more FC + C/F responses, and a greater number of total color responses.

Correlations computed between the total color score and the other variables are reported in Table 8. Only the correlations with SM ($r = .37$) and IL ($r = -.35$) were significant. These indicated that Ss who gave more color responses made more stick movements in the problem solving task and had faster response times to the inkblots.

Correlations computed between Stick Movements and the other scores are reported in Table 9. Only the correlations with IL ($r = -.34$) and #C ($r = .37$) were significant. These indicate that Ss who made more stick movements in the problem solving task had faster inkblot response times and gave more color responses.

Correlations computed between M and the separate task scores are reported in Table 10. None of these correlations were significant.

Table 6

Results of Pearson Product Moment Correlations for Total Specificity with the Combined and Separate Behavioral Control Scores

	Total Specificity
BCI	-.07
CIT	.12
MIT	-.03
SM	-.10

Table 7

Pearson Product Moment Correlations for Different Types of Color Scores with the Stick Movements Score

	SM
CSI	.01
CF + C	.26*
FC + C/F	.36*
#C	.37*

* Significant at the .05 confidence level.

Table 8

Results of Pearson Product Moment Correlations Between Total Color and Other Variables in This Study

	#C
CSI	-.08
SI	.23
Tot Spec	.00
M	-.03
IQ	.07
CIT	-.05
MIT	.21
SM	.37*
IL	-.35*

* Significant at the .05 confidence level.

Table 9

Results of Pearson Product Moment Correlations Between SM and Other Variables in This Study

	SM
CSI	-.01
SI	.27[a]
Tot Spec	-.10
M	.04
IQ	-.12
CIT	.02
MIT	.12
IL	-.34*
#C	.37*

* Significant at the .05 confidence level.

a. This correlation was not significant because it was not in the predicted direction.

Table 10

Pearson Product Moment Correlations Between M and the Separate Behavioral Task Scores

	M
CIT	.04
MIT	.10
SM	.04

Discussion

Color Specificity - Control Hypothesis

The Results in Terms of the Underlying Rationale. No support was found for Hypothesis I which posited a relationship between inkblot color response specificity and an index of behavioral control. If a general inference were made, it could be concluded that color specificity is not an indicant of behavioral control. How can this be reconciled with the rationale underlying the statements of the hypotheses of the various Rorschach authorities (Rorschach, 1942; Piotrowski, 1957; Beck, 1949; Klopfer, 1954; Rapaport et al., 1946; Shapiro, 1956)?

This rationale implies that the extent to which an individual exhibits control in one situation is related to the extent that he exhibits control in other situations. Why was there, then, no significant relationship, in this study between the various measures thought to reflect behavioral control? A strong possibility is that control varies considerably for the same individual from task to task. Evidence from this study bears on this point. No significant relationships were found between any of the measures involving control. Twain's study (1957) which investigated the interrelationship among a group of tasks representing control used a sample of 140 Ss so that correlations as low as .17 were accepted as significant at the .05 confidence level. Yet, he

obtained significance for less than a sixth of the intercorrelations among the tasks. Despite the more sensitive test for significance in Twain's study there was still very little intercorrelation. It may be argued, on the basis of this study and Twain's, that a general construct of behavioral control involves a number of separate behavioral tendencies some of which may be only minimally related.

Examples of such independent, but internally homogeneous areas may be seen in the factors found by Twain. He stated that:

> Flexible Motor Control, indicates that good control over the motor abilities involved in tracing a line very slowly is associated with the ability to withstand the discomfort of a protracted period of holding the breath. Also represented here is an element of freedom from conflict; or flexibility. In an "impulsive outburst," therefore, a rather independent factor might be the erratic motor behavior displayed. This factor lends itself to the term "lability" referring to the motor reaction aspect of the term.
>
> Positive Progressiveness, seems to be concerned with the tendencies toward a positive type of orientation and a progressive attitude. One thinks of the descriptions of impulsive behavior which utilize such phrases as "happy-go-lucky," "enjoying competition," and "action-oriented."
>
> Tenacious Self-control, appears to be involved with self-control of a "holding-in," conforming nature. Its extreme lack is associated with impulsivity. Phrases that seem apt in this regard are: "unable to delay reactions" and "uncontrollable."
>
> Aggressive Instability, has loadings depicting forcefulness, a negative orientation, irascibility, and the strong desire for change. In contrast to the "happy-go-lucky" description, impulsive behavior is sometimes described as "aggressive," "autonomous," and very "negative." (1957, p. 136)

The Relationship Between Color Specificity and Different Kinds of Control. In view of the results of this and Twain's study which suggest that there is little relationship among diverse areas of control, it is important to delineate the areas of control that color specificity is related to. The color specificity - control studies will be briefly reexamined to determine what particular areas of control have shown a greater relationship to color specificity.

The assessments utilizing depression - mania ratings (Wittenborn, 1951) and an emotional surgency factor (Singer, Wilensky, & McCraven, 1956) as measures of behavioral control provide equivocal results for the color specificity - control hypothesis. Two studies (Storment and Finney, 1953; Finney, 1955) compared assaultiveness with color specificity and found a significant relationship in only one of six comparisons. It appears that color specificity is not appreciably related to the kinds of control involved in these studies.

In seven instances measures were used which were based on broad areas of responding. Two of these were studies that compared color specificity with delinquency. Low color specificity was related significantly to delinquency in one study (Robbertse, 1955) and there were trends in this direction in the other study (Schachtel, 1951). In five other tests of the color specificity - control hypothesis, ratings based on broad areas of behavior were used as the measure of control. In three of these instances low color specificity was related

to lack of control (Gardner, 1951; Holtzman, 1950). A replication of one of these comparisons resulted in a near zero correlation (Holtzman, 1950). In the last instance (Rapaport et al., 1946) behavioral control was related to one measure of color specificity (CF), but not to another measure (FC). These results, taken together, suggest that behavioral control, measured broadly, is more strongly related to color specificity than are the kinds of control reflected in the other measures which have been used.

In the instances cited the behavior measured may be generally categorized as "social." If one of the difficulties in relating inkblot specificity to behavioral control is the artificiality or narrowness of the measures of control, then measures encompassing broad response areas (e.g., rating scales) may hold promise. It may also be that social behavior is particularly linked to inkblot color specificity.

While the results in these studies suggest that color specificity may be related to socially evaluated behavior, nevertheless, the instances of nonconfirmation and the failure to separate specificity from total color leave room for much further experimentation.

Results in Light of Statements Made by Rorschach Authorities. The results dealing with the color specificity - control hypothesis have been discussed in terms of its rationale. How these results relate to the various statements of the hypothesis made by the Rorschach authorities will now be

considered. The statements may be categorized in two groups, those which refer to the emotional aspect of behavioral control, and those which speak of control more generally. In the former group are Rorschach (1942), Beck (1949), and Piotrowski (1957). The term "emotional" is used extremely loosely by these authors. If "emotional" is taken to mean expression of affect, such as crying, laughing or angry outbursts, then the results of this study are not particularly applicable since the measures used here do not evaluate emotional control specifically. For the same reason these results are not applicable if "emotional" is taken to mean intense motivational states.

Rapaport et al. (1946), Klopfer (1954), and Shapiro (1956) deal with a more general notion of control. Behavioral control taken more broadly would include control over many areas of behavior in which the emotional component has a lesser role. Klopfer uses the phrase ". . . capable of controlled responsiveness to his social environment, responding appropriately with both feeling and action . . ." (1954, p. 296). Rapaport et al. speak of control of "actions and impulses" (1946, pp. 241-242). Shapiro deals with control even more broadly: "An incapacity for the delay of discharge (lack of control) can occur on many levels and in many forms and degrees . . ." (1956, p. 58). The results of this study do not support the hypotheses which treat control as a general construct. To satisfy a general construct of control there

should be relationships between color specificity and the various measures of control, and also among the measures of control. These relationships were not found.

Further Explanation for Lack of Confirmation of Hypothesis I. It was noted that a number of independent aspects of behavioral control may be involved in the different tasks used in this study. This suggests that the combined index of behavioral control used here possibly reflected a different kind of control than is involved in color specificity. It may be that samplings of control in many areas of behavior such as behavioral ratings, self-report questionnaires, and objective measures would have provided a better representation of the control tapped by the color specificity index.

Another likely factor in the lack of confirmation of the color specificity - control hypothesis is the truncated range of color specificity scores. While there are many instances of CF, C/F and FC, there are only three C scores (the score which should be most representative of lack of delay). This frequency of C is typical for a normal population. Rorschach and the other test experts apparently worked largely with clinical populations where C scores are much more frequent. Furthermore, in clinical populations there is to be expected a greater range of scores extending through to both poles. Not only would there be greater incidence of lack of delay in pathologically uncontrolled patients, but also greater incidence of overdelay in overcontrolled patients. For such a

population the color specificity - control hypothesis tested by this study's design, may have greater probability of being confirmed. An additional possibility to be tested is that rather than there being correlation over the entire range, a relationship exists only for the extreme groups.

The type of inkblot administration used in this study may also have contributed to the lack of relationship. Inkblot test administration generally allows free responding. The restrictions on responding in this study (no more, nor less, than two responses per card) may have affected the subject in some way so that his typical control tendencies were overshadowed by some other factor. Yet despite the use of this type of responding other aspects of color and control, to be discussed below, were found to be correlated.

Could it be that the facet of behavioral control which is related to specificity is so delicate that changes in any of the factors discussed are enough to prevent it from being manifested? Further research in which these factors are systematically manipulated is necessary to answer these questions.

Analysis of Component Scores in the Color and Behavioral Control Indices.[4] Since the behavioral control tasks used

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4. The analyses beyond the major hypotheses are post hoc and each additional analysis raises the probability of finding a significant relationship. Therefore, discussion of these further analyses is speculative in nature and intended primarily to point the way for further research.

here had little commonality, correlations between the Color Specificity Index and the control tasks may have been concealed by combining these tasks into one index. It is also possible that only one kind of color score was related to measures of control whereas the others were not. Therefore, additional correlations were computed among the separate scores which constituted the color specificity and behavioral control indices (Table 5).

Only one of the six correlations was significant at the .05 confidence level. In view of the increased probability of finding significance when additional tests are made, this does not seem to constitute sufficient grounds for any change in the conclusions which were made regarding the results for Hypothesis I.

The significant correlation was between CF + C and SM ($r = .26$) and indicates that Ss giving more color responses with nonspecific form or no form made more stick movements on the problem solving task.

The CF + C score, as was noted earlier (see p. 4), measures not only color specificity, but also color total. It is not likely that the CF + C to SM correlation is a function of the specificity component of the color responses as the correlation between the color specificity index and SM was .01. It is more likely that this correlation was a function of color total, as a significant correlation of .37 was found between color total (#C) and SM (Table 7). The correlation

between SM and #C indicates that Ss who gave more color responses made more stick movements in the problem solving task.

A positive significant correlation (r = .36) was found when SM was correlated with the combined FC + C/F score (Table 7) indicating that Ss who gave a greater number of specific color responses also made more stick movements on the problem solving task. This finding is contrary to the color specificity - control hypothesis, but may be explained by a color total-overt expression hypothesis which will be discussed further below. The extent to which color total is present in the FC + C/F score becomes apparent when it is noted that about two thirds of the total number of color responses are included in this score.

Some of the inconsistencies in earlier studies (Rapaport et al., 1946; Singer et al., 1956) where the FC relationships were not ordered in the expected direction, similarly, may have been due to the operation of the total component rather than the specificity component of the color responses.

Overt Expression and Color Responses. Further correlations were computed between #C and the other measures (Table 8), and also between SM and the other measures (Table 9). These computations show that #C correlated significantly only with SM and Inkblot Latency (IL), and that SM correlated significantly only with #C and IL.

These correlations suggest that the following response tendencies go together: (a) greater use of color per se,

(b) faster response time, and (c) greater overt responding in problem solving situations. The common factor appears to be overt expression. This is consonant with the statements of Rorschach authorities concerning color total or the approximate color total measure, Sum C.

Rorschach stated the following: "There is a definite correlation between the extent of emotional excitement, the extent of motor activity, and the number of responses influenced by color perception" (1942, p. 98). The statements dealing with color total by other authorities refer to aspects of behavior such as energy (Beck, 1945), and overt reactivity (Klopfer et al., 1954). These terms might all be considered as facets of overt expression.

The Specificity - Control Hypothesis

The Results Proper. No support was found for the second hypothesis which posited a relationship between inkblot form specificity and the Behavioral Control Index. The conclusions made for the color specificity - control hypothesis may be extended as follows: regardless of whether color had a role in the inkblot response or not, the kind of control manifested in the specificity of the inkblot responses was not very similar to the kinds of control manifested in the behavioral tasks.

Siipola (1952) contended that the specificity of responses is related to behavioral control. Her statement may require greater definition of behavioral control, for in this

study specificity was not related to three different measures of behavioral control.

It was noted previously that a possible contribution to the lack of correlation in the measures dealing with color specificity and control, was the truncated range of color specificity scores. The distribution of form specificity scores (again typical of a nonclinical population) was even more truncated. There were no abstract responses (N), the form equivalent of the pure color response. Again, it is pointed out that in a clinical population the specificity - control hypothesis may be more tenable.

No correlations computed among the components of the specificity and behavioral control indices reached the .05 level of significance. Thus it may be said for the tests of the two hypotheses that no relationships were obscured by any irrelevant components being included in these indices.

An Additional Test of the Specificity - Control Hypothesis. It will be remembered that the measure used to test the specificity - control hypothesis was obtained only from the form responses to the achromatic cards in order to rule out any possible influence of color or other blot qualities on the responses. Since neither form nor color specificity was found to be related to the control measures, it was decided to test a score based on the specificity of every response in the protocol. This total specificity score has the advantage of representing a much larger sample of inkblot behavior than

did either the specificity or color specificity indices alone. None of the correlations between Total Specificity and the behavioral control measures approached significance at the .05 confidence level (Table 6). These results, based on the subject's entire protocol rather than on just a small subgroup of responses, lend further weight to the conclusions which were made about the specificity - control hypothesis.

Intelligence and Human Movement Factors Bearing on the Hypothesized Relationships

It was noted earlier that intelligence and human movement scores might be intercorrelated with behavioral control and specificity. Partial correlations, however, revealed no important changes in the relationships involved in the two hypotheses when IQ and M were partialled out (Table 4).

Although total specificity did not correlate significantly with any of the behavioral control tasks (Table 6), it did correlate significantly with the intelligence score ($r = .34$). This can be accounted for by the nature of the inkblot task. It allows the delineation or differentiation of complex forms which in turn requires intellectual ability. Possibly intellectual ability is a more predominant factor in the specificity score than is behavioral control.

The Human Movement score did not correlate significantly with any of the major variables nor with the separate task scores (Table 10). This is of particular interest in regard to the MIT and CIT scores for these have previously been

shown to be related to M (Singer & Spohn, 1954; Singer & Hermann, 1954; Meltzoff et al., 1953; Levine & Meltzoff, 1956). The difference in findings may have been due to the differences in test administration or subject populations. Further research with M scores and behavioral control measures appears warranted to clarify the role of these factors.

Summary and Conclusions

In their employment of the Rorschach Test, experts have informally hypothesized a relationship between the specificity of inkblot color responses and behavioral control. This relationship has been explained as a function of the tendency of less controlled people to respond overtly to the first thing they perceive (color) with nonspecific responses while more controlled people tend to delay their initial reaction and respond more frequently with specific responses to the relatively difficult to perceive form aspects of the blots. Indirect support for the color specificity - control hypothesis comes from perceptual, conceptual, and developmental studies, but the overall results of more direct tests appear to be equivocal.

An additional hypothesis has been suggested that specificity of form, even when color is absent, is related to behavioral control, since greater specificity requires more delay.

This study tested both the color specificity - control and specificity - control hypotheses with an inkblot administration requiring a constant number of responses and a battery of three tasks. Prior analysis of these tasks suggested that they involve behavioral control. Furthermore, in various studies, these tasks had been found to be related to other inkblot scores (M and M/C) also considered to be

indicants of behavioral control.

The first task was a problem solving task requiring sticks to be moved in order to change the number of squares in a pattern. It provided a measure of the total number of stick movements made. The second task required Ss to slow down their normal writing tempo as much as they could. The measure was total response time. The third task first required S to learn paired associates to a criterion, and then to inhibit the learned response word and respond with any other word to the stimulus word. The measure was the median latency of responding with a new word, minus S's median basal association time derived from an alternate set of words. A vocabulary test was also administered to provide a control measure for intelligence.

The subjects consisted of 40 volunteers drawn from a population of Veterans Administration general medical and surgical patients. Those with severe or psychosomatic ailments were excluded.

In the test of the first hypothesis no significant relationship was found between the specificity of color responses (Color Specificity Index) and the degree of control in the combined battery of behavioral control tasks (Behavioral Control Index). In the test of the second hypothesis the relationship between the specificity of form responses (Specificity Index) and the degree of control in the combined battery of behavioral control tasks also was not significant.

Controlling for the effects of intelligence or the tendency to give human movement responses did not affect either of these findings. Analysis of the correlations of the individual behavioral tasks with either the separate color or specificity scores revealed no support for the hypothesized relationships. These results were contradictory to broad statements of color specificity - control or specificity - control hypotheses.

An additional test of the specificity - control relationship made by utilizing the specificity of all twenty-four inkblot responses also revealed no significant correlation.

The lack of correlation between specificity and control in this study may have resulted from any of the following:

1. Inkblot specificity scores may be poor indicants of control.
2. Color specificity or form specificity may have little relation to the type of behavioral control measured by the tasks of this study. Rather, inkblot specificity may be related to a specific area of control (e.g., emotional control) which was not prominent in any of the behavioral tasks used.
3. The specificity score may not reflect behavioral control for a test administration where a constant number of responses is required.
4. A nonclinical population may not respond over a broad enough range of specificity or behavioral

control to allow the demonstration of a specificity - control relationship.

5. The tasks used may evaluate only a restricted range of behavioral control.

Intercorrelations between Total Color, Stick Movements, and Inkblot Latency suggest a common overt expression factor. A color total - overt expression relationship may have been responsible for contrary findings in previous studies.

Further systematic experimentation with the following variables should make clearer the nature of a specificity - control or color specificity - control relationship: (1) subject population, (2) inkblot test administration, and (3) behavioral control measures. For a better understanding of color responding it seems desirable to experiment further with measures differentiating the color total and color specificity components of color responses.

This study has attempted to deal with basic relationships among behavioral processes in order to lead to more precise clinical use of inkblot responses. The orientation was toward building sounder basic knowledge upon which to construct improved devices for evaluating personality. The results serve to remind us that the science of predicting behavior from inkblot test responses is still in an early stage of development.

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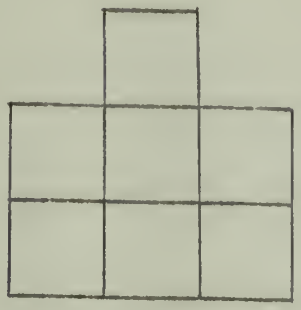
Appendices

Appendix A

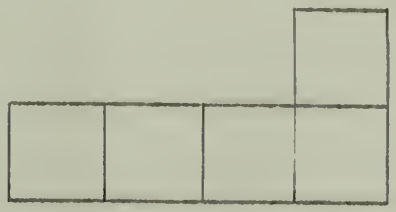
Diagrams of the Stick Problems

I.



Move only two sticks to make one less square.

II.



Move only three sticks to make one less square.

III.

IV.

Appendix B

Guide for Specificity and Color Scoring

The scoring classes were determined by the following rules:

	Description	With color	Without color
1.	No form: an abstract idea	C	N
2.	Nonspecific: the percept could have many different shapes	CF	NS
3.	Moderately specific: percepts with simple geometric shapes or a moderate degree of amorphousness	C/F	N/S
4.	Specific: more complex and relatively fixed forms	FC	S

Credit for specificity is given only when the subject is able to delineate the structure of his percept. For example, "mushroom" or "atomic cloud" requires a stem and transverse top piece. A specific scoring for "man" requires the subject to point out at least three parts such as head, arms, and body.

Appendix C

A Sample of Inkblot Responses Found in This Study and Their Scores

Response	Inquiry	Score
The only thing I could think of is a bat.	The tail, the wingspread, the head	S
Two men with long noses.	Eyes, nose, chin, mouth. (?) Just the faces.	S
The only thing I can possibly say about this is a bone.	The neck bone of a duck or chicken, the flesh peeled back.	N/S
This part resembles South America.	Kind of long and curvy. (?) Tapered here.	N/S
Could be a flower.	Overall shape, but not very much like a flower.	NS
The liver or the kidneys. I'd say the liver.	One on each side. The shape of it.	NS
Looks like sea life.	Crabs of different types (?) eyes, mouth, pincers, legs, and antenna.	FC
Couple of green faces.	Masks - green masks - eyes, nose, mouth.	FC
The rear end of a cancan girl.	Two legs covered with red pantaloons - boufant dress being thrown out.	C/F
Looks like an atomic explosion.	Mushroom on top, center-piece - upheaval around it - the colors.	C/F
That's a valley with two very sheer cliffs. Looks like a desert in the background.	Orange is cliffs - shape only, the coloring too, I guess - light blue makes it look like a hot humid desert.	CF
Could be a tree, decorated.	Imitation tree - painting of it - just the trunk (?) the colors.	CF
Pink colors.	Like an artist's colors.	C

Appendix D

Individual Subject's Scores on the Major Variables

S#	MIT	CIT	SM	BCI	CSI	SI	IQ	M
1	120	0.75	5.45	-49	4.71	4.80	68	6
2	70	2.25	2.94	-56	3.67	4.40	83	3
3	14	0.00	1.74	-43	5.00	4.67	81	3
4	20	0.75	1.22	-44	3.86	4.00	88	2
5	10	0.00	2.92	-52	4.25	4.71	73	2
6	15	1.75	4.69	-65	5.00	4.25	82	1
7	5	0.50	0.92	-42	5.00	4.00	67	6
8	34	-1.00	0.19	-27	4.50	4.29	58	1
9	93	-0.75	1.15	-32	4.25	4.00	86	2
10	5	1.25	2.81	-62	4.00	4.50	63	5
11	27	0.50	2.13	-46	3.50	4.50	79	0
12	9	0.50	2.13	-54	3.00	4.75	81	0
13	1	-1.00	2.31	-49	4.64	4.29	64	5
14	5	0.00	4.48	-59	4.25	5.00	43	1
15	110	0.75	1.63	-38	3.25	4.67	93	2
16	10	0.00	4.26	-57	4.25	5.00	66	0
17	8	1.75	1.74	-58	4.00	4.33	66	0
18	121	0.75	1.88	-35	3.67	4.38	68	3
19	3	3.75	0.38	-60	4.00	5.00	77	5
20	21	1.00	1.57	-48	3.50	4.67	42	2

Appendix D (continued)

S#	MIT	CIT	SM	BCI	CSI	SI	IQ	M
21	62	2.50	1.30	-45	3.00	4.28	64	0
22	24	0.00	2.55	-46	3.67	4.63	40	1
23	57	1.25	2.04	-48	4.17	4.63	71	0
24	11	0.50	2.44	-53	4.00	4.00	60	2
25	59	-0.50	3.02	-38	4.40	4.80	81	3
26	22	-0.50	1.48	-36	4.00	4.22	83	1
27	27	0.25	3.19	-44	3.20	4.29	43	1
28	2	-0.75	1.13	-38	4.00	3.71	40	1
29	44	0.75	3.56	-51	4.25	4.50	38	2
30	1	0.50	3.68	-68	3.50	3.86	49	2
31	3	1.50	1.75	-61	4.00	5.00	68	0
32	53	-0.50	8.00	-50	3.33	4.00	65	1
33	2	0.50	1.56	-55	3.83	4.80	76	0
34	25	3.00	1.19	-64	3.67	4.56	50	2
35	12	-0.50	2.69	-47	3.67	4.50	62	1
36	15	0.00	1.69	-41	3.33	4.29	84	2
37	38	1.00	1.20	-73	3.50	3.80	83	1
38	25	2.00	1.90	-56	5.00	5.00	89	5
39	38	1.25	2.50	-51	4.00	4.50	88	2
40	29	0.00	4.73	-54	3.83	5.00	93	3

Appendix E

Individual Subject's Scores on the Additional Variables

S#	FC	C/F	CF	C	#C
1	6	2	0	0	8
2	0	3	3	0	6
3	3	0	0	0	3
4	1	4	2	0	7
5	2	1	1	0	4
6	1	0	0	0	1
7	1	0	0	0	1
8	1	1	0	0	2
9	3	1	1	0	5
10	4	3	4	0	11
11	1	1	4	0	6
12	0	0	2	0	2
13	1	0	1	0	2
14	2	1	1	0	4
15	0	1	3	0	4
16	4	2	2	0	8
17	1	0	1	0	2
18	1	2	3	0	6
19	0	1	0	0	1
20	0	2	2	0	4

Appendix E (continued)

S.#	FC	C/F	CF	C	#C
21	0	0	1	0	1
22	0	1	2	0	3
23	2	3	1	0	6
24	0	1	2	0	3
25	3	1	1	0	5
26	0	1	0	0	1
27	0	1	4	0	5
28	2	0	2	0	4
29	2	1	1	0	4
30	0	1	1	0	2
31	3	2	3	0	8
32	0	2	4	0	6
33	2	1	1	2	6
34	1	0	2	0	3
35	1	4	1	0	6
36	0	1	1	1	3
37	0	1	1	0	2
38	1	0	0	0	1
39	3	4	4	0	11
40	1	3	2	0	6

Appendix E (continued)

S#	S	N/S	NS	Tot Spec	IL
1	3	1	0	4.71	11.0
2	2	1	2	4.29	28.5
3	3	2	0	4.58	6.5
4	2	2	2	4.21	10.0
5	4	1	1	4.63	11.5
6	3	4	1	4.25	23.5
7	0	2	0	4.58	20.0
8	3	3	1	4.58	35.0
9	0	1	0	4.08	35.0
10	1	1	0	4.25	8.0
11	3	2	1	4.13	25.0
12	3	1	0	4.38	20.5
13	3	3	1	4.58	34.0
14	1	0	0	4.29	13.5
15	4	1	0	4.25	16.0
16	2	0	0	4.58	28.0
17	2	5	0	4.63	37.5
18	4	0	2	4.21	29.5
19	9	0	0	4.75	46.5
20	4	2	0	4.54	37.5

Appendix E (continued)

S#	S	N/S	NS	Tot Spec	IL
21	2	5	0	4.04	13.0
22	6	1	1	4.29	35.0
23	4	1	0	4.50	10.5
24	1	1	1	4.13	34.0
25	4	1	0	4.63	12.5
26	5	2	2	4.54	16.5
27	5	2	1	4.08	25.5
28	1	3	3	4.08	30.5
29	4	1	1	4.17	36.0
30	5	1	1	4.33	21.0
31	2	0	0	4.38	18.0
32	1	1	1	4.58	8.0
33	4	1	0	4.29	31.5
34	6	2	1	4.38	32.0
35	1	2	0	4.00	12.0
36	3	3	1	4.33	42.5
37	1	2	2	4.13	11.0
38	6	0	0	4.88	18.0
39	4	0	1	4.50	13.0
40	6	1	0	4.29	10.0

Acknowledgments

I wish to express heartfelt appreciation to Professor Solis Kates for his time, advice, and guidance throughout this project. I am indebted to Dr. Arnold Trehub for his aid with technical problems, and to the other members of my thesis committee, Professor Claude C. Neet, and Dean Robert Wagner for their valuable advice and assistance.

I wish to express thanks to the Veterans Administration for providing the opportunity and subjects to carry out this study; to Dr. Isadore Scherer, and Dr. Bernard Locke who were instrumental in this respect.

I am grateful to my wife Joan, and to Charles Nelson both of whom served as scoring judges.

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Date: October 31, 1961